**DRAFT OF RELATED LITERATURE**

**Honda**

**Honda Motor Co., Ltd.** (本田技研工業株式会社 *Honda Giken Kōgyō Kabushiki Kaisha*) is a Japanese manufacturer of cars, trucks, motorcycles, and scooters. They also make ATVs, electrical generators, marine engines, and lawn and garden equipment. With more than 14 m illion internal combustion engines built each year, it is the largest engine-maker in the world. In 2004, it began to produce diesel motors, which are very quiet and do not require particulate filters to pass pollution standards.

**Diesel Engine**

A diesel engine (also known as a compression-ignition engine and sometimes capitalized as Diesel engine) is an internal combustion engine that uses the heat of compression to initiate ignition to burn the fuel, which is injected into the combustion chamber during the final stage of compression. This is in contrast to spark-ignition engines such as a  gasoline engine or gas engine (using a gaseous fuel as opposed to gasoline), which uses a spark plug to ignite an air-fuel mixture.

**Gasoline Engine**

A gasoline engine is an internal combustion engine with spark-ignition, designed to run on gasoline and not diesel and similar volatile fuels.

### Cylinder arrangement

Common cylinder arrangements are from 1 to 6 cylinders in-line or from 2 to 16 cylinders in V-formation. Flat engines -- like a V design flattened out-- are common in small airplanes and motorcycles and were a hallmark of Volkswagen automobiles into the 1990s. Flat 6s are still used in many modern Porsches. Many flat engines are air-cooled. Less common, but notable in vehicles designed for high speeds is the W formation, similar to having 2 V engines side by side. Alternatives include rotary and radial engines the latter typically have 7 or 9 cylinders in a single ring, or 10 or 14 cylinders in two rings.

### Cooling

Petrol engines may be air-cooled, with fins (to increase the surface area on the cylinders and cylinder head); or liquid-cooled, by a water jacket and radiator. The coolant was formerly water, but is now usually a mixture of water and either ethylene glycol or propylene glycol. These mixtures have lower freezing-points and a higher boiling-points than pure water and also prevent corrosion, with modern antifreezes also containing lubricants and other additives to protect water pump seals and bearings. The cooling system is usually slightly pressurized to further raise the boiling point of the coolant.

### Compression ratio

The compression ratio is the ratio between the total volumes of the cylinder AND the combustion chambers - at the beginning, and end of the compression stroke. Broadly speaking, the higher the compression ratio, the higher the efficiency of the engine. However, compression ratio has to be limited to avoid pre-ignition of the fuel-air mixture which would cause engine knocking and damage to the engine. Modern motor-car engine overall have compression ratios of between 9:1 and 10:1, but this can go up to 11 or 12:1 for high-performance engines that run on higher octane fuel

### Ignition

Petrol engines use spark ignition and high voltage current for the spark may be provided by a magneto or an ignition coil. In modern car engines the ignition timing is managed by an electronic Engine Control Unit.